RMI
ENERGY. TRANSFORMED.

Fast-Tracking DER Projects: A Toolkit for Utilities, Developers, and Financiers

October 2024

Supported by:

Global Energy Alliance for People and Planet
GEAPP

Agenda

- **Presentation**
  1. RMI's Nigeria DER work
  2. The DER Toolkit
  3. DER toolkit resources overview
  4. Case studies
- **Panel discussion**

Notes

- This webinar is being recorded and will be posted on RMI's event page within 24 hours of this event.
- Please send any questions on the presentation material in the chat.

Speakers and organizers

Suleiman Babamanu
Director, RMI

Alberto Rodríguez
Manager, RMI

Wayne Omonuwa
Manager, RMI

Fauzia Okediji
Manager, GEAPP

Olatunde Okeowo
Senior Associate, RMI

Fola Aminu
Senior Associate, RMI

Ridwan Zubair
Associate, RMI

Collins Dadzie
Senior Associate, RMI

Sakhi Shah
Senior Associate, RMI

RMI – Energy. Transformed.

RMI's Africa Energy Program works with local partners to ensure sustainable electricity access for just and equitable development

RMI is an independent, nonprofit organization of experts working with global partners to accelerate the clean energy transition. Our mission is to transform the global energy system to secure a clean, prosperous, zero-carbon future for all.

SCALING DISTRIBUTED ENERGY

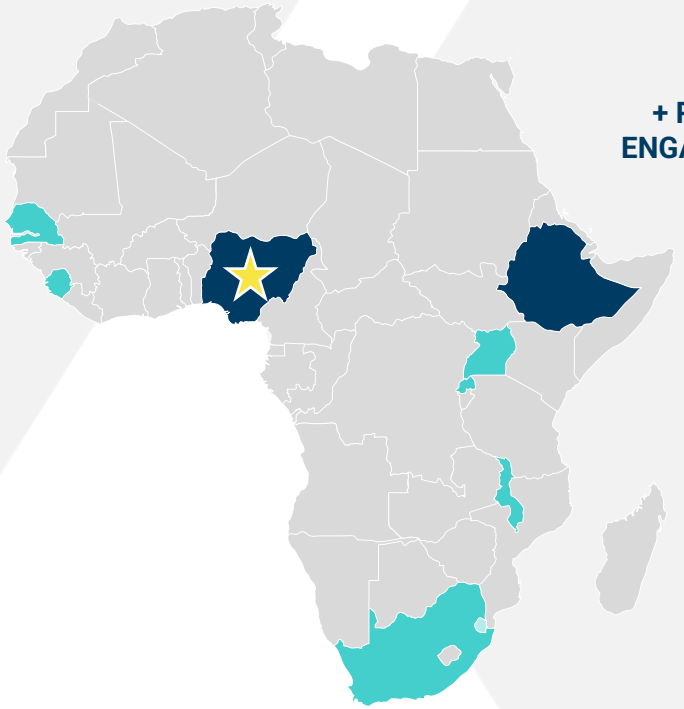
Working with local partners to implement DERs that test innovative business models to catalyze sector growth

EFFICIENT DEMAND STIMULATION

Enabling communities and industries to adopt energy efficient technologies, that help drive productive use of energy tied to local economic development

UNLOCKING POWER SYSTEM TRANSFORMATION

Supporting governments and utilities to plan electricity system investment to drive economic development



Our team currently focuses on core work in Nigeria and Ethiopia, with partnerships in additional countries for scaling.

RMI Expertise across the DER value chain: Think – DO – Scale

Thought leadership and strategic guidance	• DER roadmap: 22+ GW opportunity by 2033 • NERC's embedded generation monitoring tool • Harvesting sunshine: PUE impact on minigrid's LCOE • Minigrids in the Money
Workforce development and sector convening	• RMI's Nigerian DisCo Fellowship • DisCo/NERC 2024 convening on roadmap and toolkit • REG stakeholder convening
Project development support, and technoeconomic analysis	• World Bank DARES for 40 IMG sites project preparation • USTDA Commercial and Industrial (C&I) • RMI's Catalytic Climate Capital initiative
Project execution and completion support	• UK-PACT Renewable Embedded Generation (REG) • GEAPP IMG pilot project support • USTDA 20 utility-enabled C&I feasibility studies

Upstream

Downstream

Global Energy Alliance for People and Planet

THE WORLD BANK

USTDA U.S. TRADE AND DEVELOPMENT AGENCY

UK PACT

THE AFRICAN CLIMATE FOUNDATION

The Alliance: a robust and growing coalition of partners

Global Energy Alliance for People and Planet

Funding Partners

The Rockefeller Foundation · IKEA Foundation · Bezos Earth Fund · Mastercard Foundation

Investment Partners

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Delivery Partners

All ON · Odyssey · ESMAP Energy Sector Management Assistance Program · Sustainable Energy for All · RMI · Power Africa A U.S. Government-led Partnership · Chapel Hill Denham · Nithio · clasp

- exists to support developing countries to transition to net zero emissions.
- works to achieve universal energy access and a just transition to renewable energy in Africa, Asia, Latin America and the Caribbean.

Carbon — 4B tons of GHGs avoided or averted

Access — 1B underserved people

Jobs — 150M green jobs enabled

Nigeria case study: A comprehensive approach to tackling energy access

GEAPP's work is reinforcing the impact of blending public and market-led approaches on advancing the country's priorities.

Nimble technical assistance to accelerate the design of WB DARES program

Nigeria Electrification Project (NEP)

Nigeria's $750M WB DARES Program (incorporating these models approved targeting 18 million people with access)

Testing and deploying innovations through support to private developers and Utilities/DisCos:

- Via **interconnected mini-grids pilots (**TA & Grants)
- Pipeline & Ecosystem building to **scale utility-DREs**

Least-cost electrification planning tool has shown that DRE solutions will be the most viable for connecting 75% of unelectrified Nigerians

Supporting Private Developers/ Entrepreneurship through:

- **The AllOn Hub** provides venture-building support to DRE companies
- REA & RMI **ag-energy interventions** in mini-grid communities
- **Results-based finance for stand-alone DREs & productive use** through SEforALL's UEF SSPU

Energy Transition Office - Strategic communications and advocacy around Nigeria's energy transition plan toward net zero by 2060.

Blended Finance Models:

- The Energy Transition and Access Facility for Africa (ETAFA) **$50M equivalent in local currency debt**
- **Pooled procurement and working capital support** via Demand Aggregation for Renewable Technologies (DART)
- **Pension funds committed to deploying funding** for DRE and related investment

Global Energy Alliance for People and Planet

Deploying philanthropic capital to enable electrification via Distributed Renewable Energy (DRE)

1. RMI's utility-enabled DER work

What is a Utility-Enabled Distributed Energy Resource (DER)?

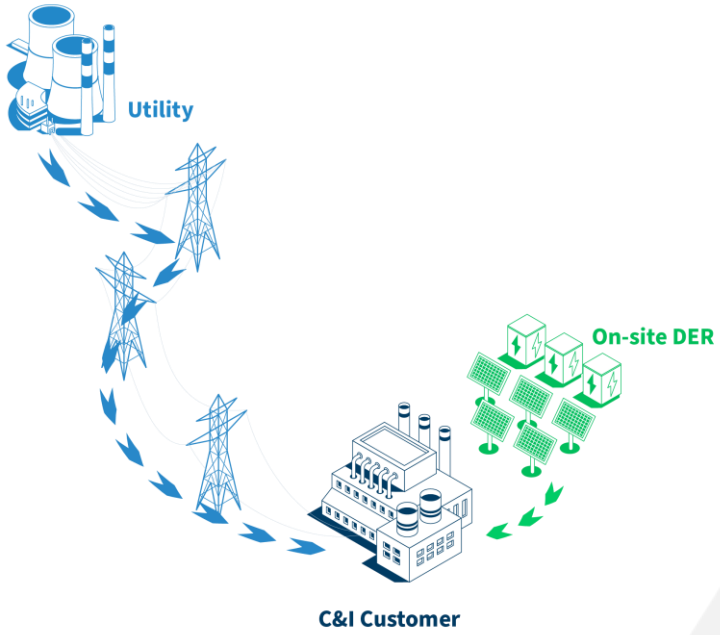
- A DER that can buy and sell electricity to and from the **regional or national utility**
- **Leverages existing distribution infrastructure** and supplies a location or community with weak grid supply

Utility-enabled DERs create a 'win-win-win'

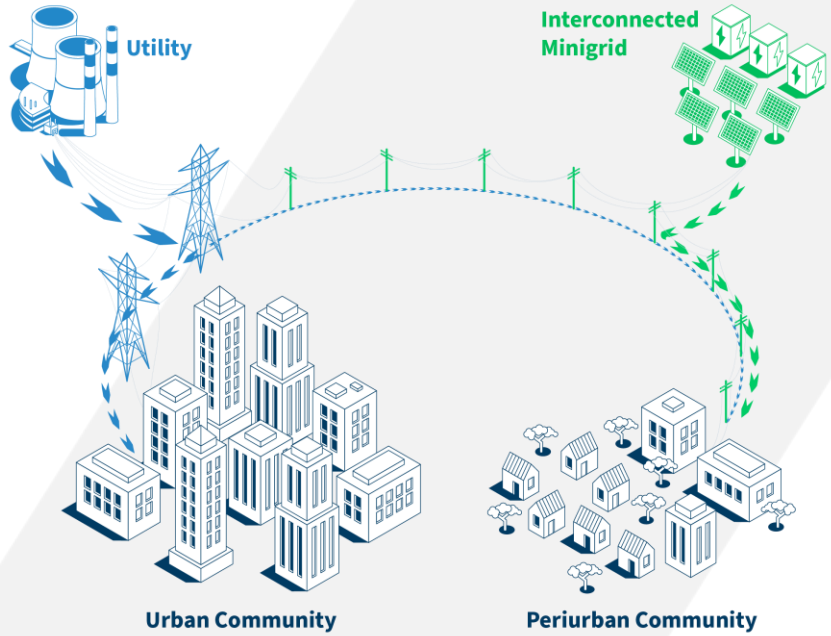
Utilities leverage private capital to **improve distribution network, increase generation,** and **retain customers.**

DER developers can leverage existing infrastructure and utility customer relationships to **access customers at scale.**

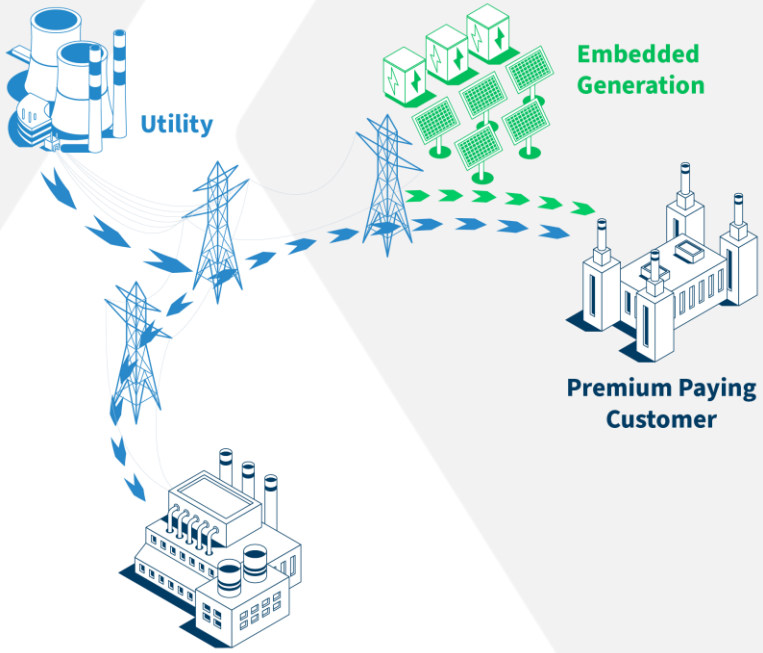
Customers receive **cheaper and more reliable** electricity, blending grid and DER supply.



Utility-enabled C&I

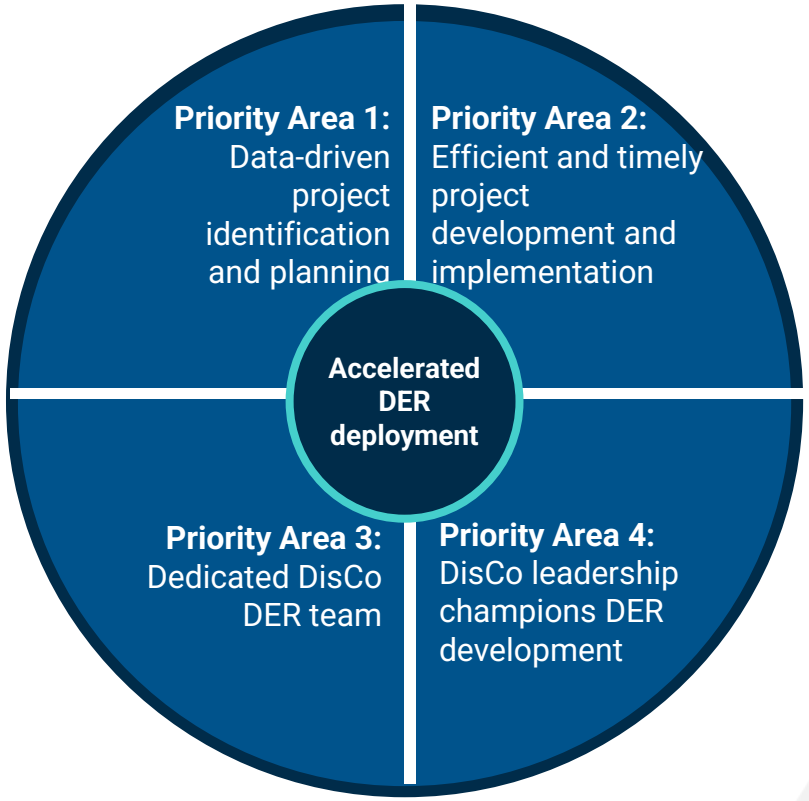


Interconnected Minigrid (IMG)



Embedded Generation (EG)

The DER roadmap presents a set of recommendations to scale and accelerate DER deployment to close DisCos' supply gap



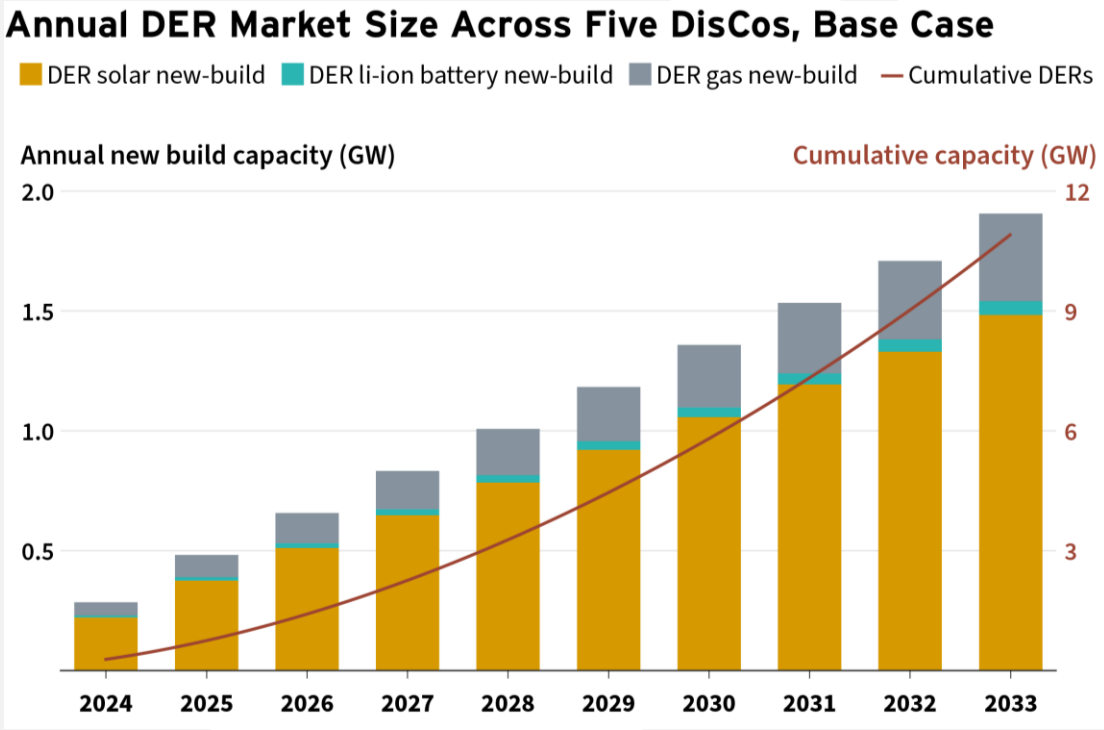
A **22 GW market opportunity** for utility-enabled DERs is possible over the next 10 years

DisCos can achieve **20% ATC&C loss reduction** with new DER assets

On average, over **₦70 billion (~US$50 million) revenue increase** can be realized by each DisCo every year

DERs present a **$14 billion investment opportunity** over the next decade

DER customers can **reduce energy costs by up to 25%** by displacing existing fossil-fueled generators



2. The DER Toolkit

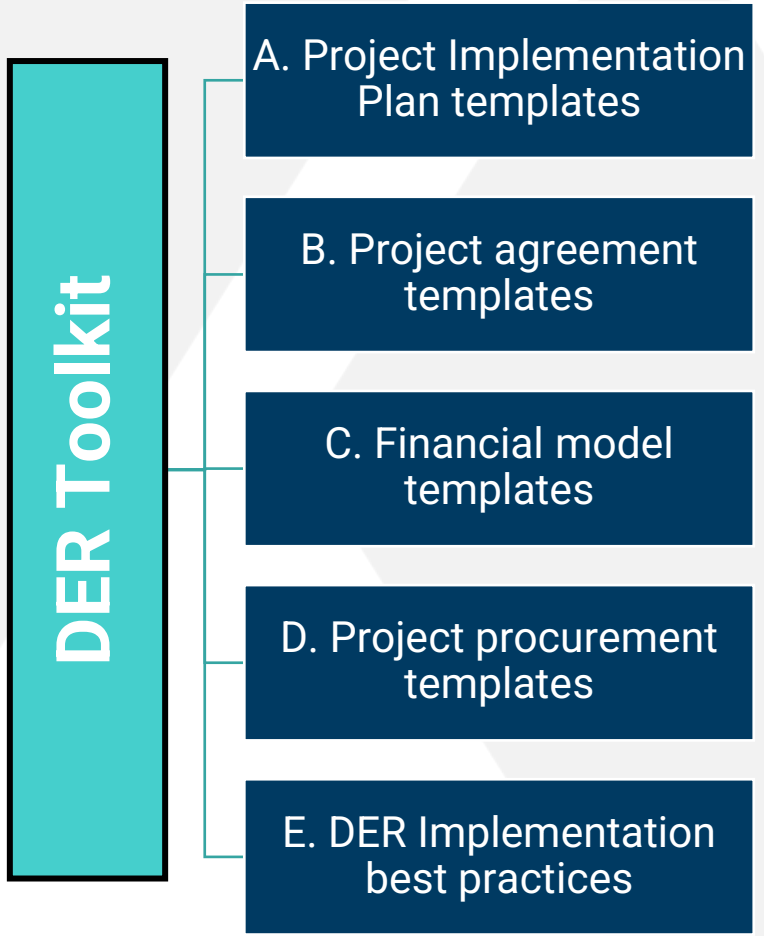
The DER Toolkit provides standardized resources for key documents in DER project preparation and implementation

Objectives

Improving understanding of utility-enabled DER business models among DisCos and developers, thereby increasing their ability to implement these business models

Providing useful guides and **templates** that **simplify and accelerate** the project implementation process for DisCos and developers

Standardizing and harmonizing documentation between DisCos and developers, thereby **reducing misalignment** during the project identification, negotiation, and execution process and accelerating overall implementation

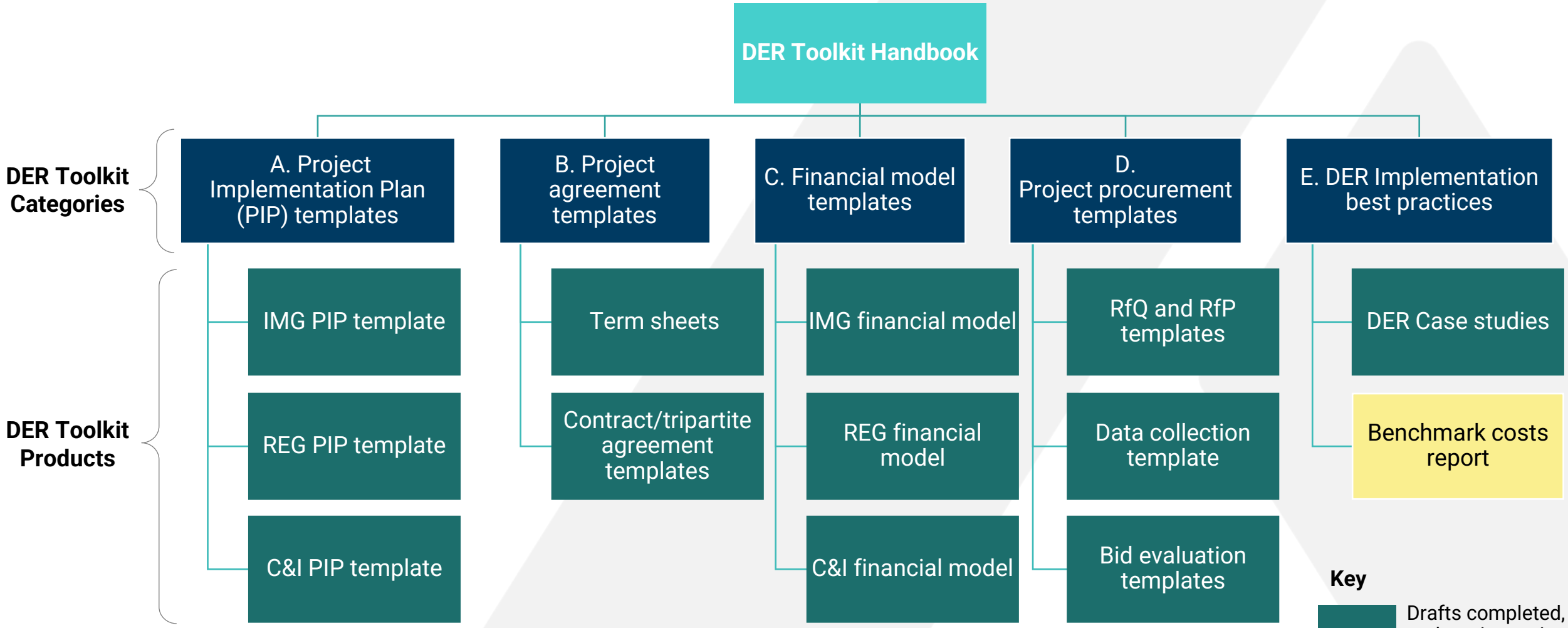


The first wave of projects demonstrates the need to standardize and streamline processes

- **A utility-enabled DER project can be completed within 12 months—from project initiation through to project commissioning.**
- **The DER Project Implementation Plan outlines the steps and processes under each phase and details the R&R of DisCos and developers.**

3. DER toolkit resources overview

DER toolkit resources overview



RfQ = request for quotations
RfP = request for proposals

The DER Toolkit Handbook provides a guide on how to use the standardized tools in the DER Toolkit

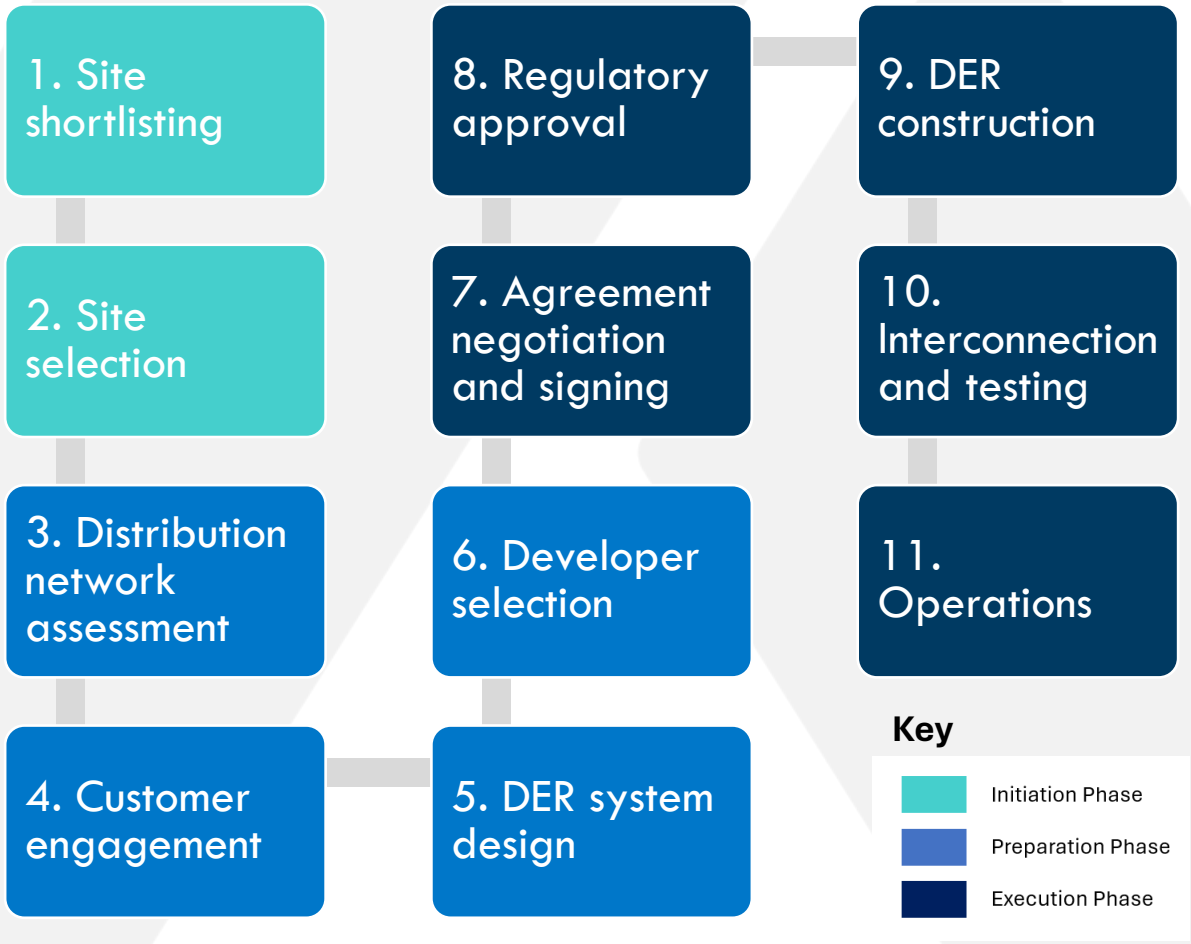
What the DER Toolkit Handbook does

- Introduces users to utility-enabled DERs and describes how they can benefit DisCos and their customers
- Describes why the DER Toolkit is necessary, the objective, and how and when to use the tools during the project implementation process
- Describes wider initiatives that will help DisCos successfully scale DERs

A. Project implementation plan templates explain the steps required to execute each business model

The project implementation plan templates will help users…

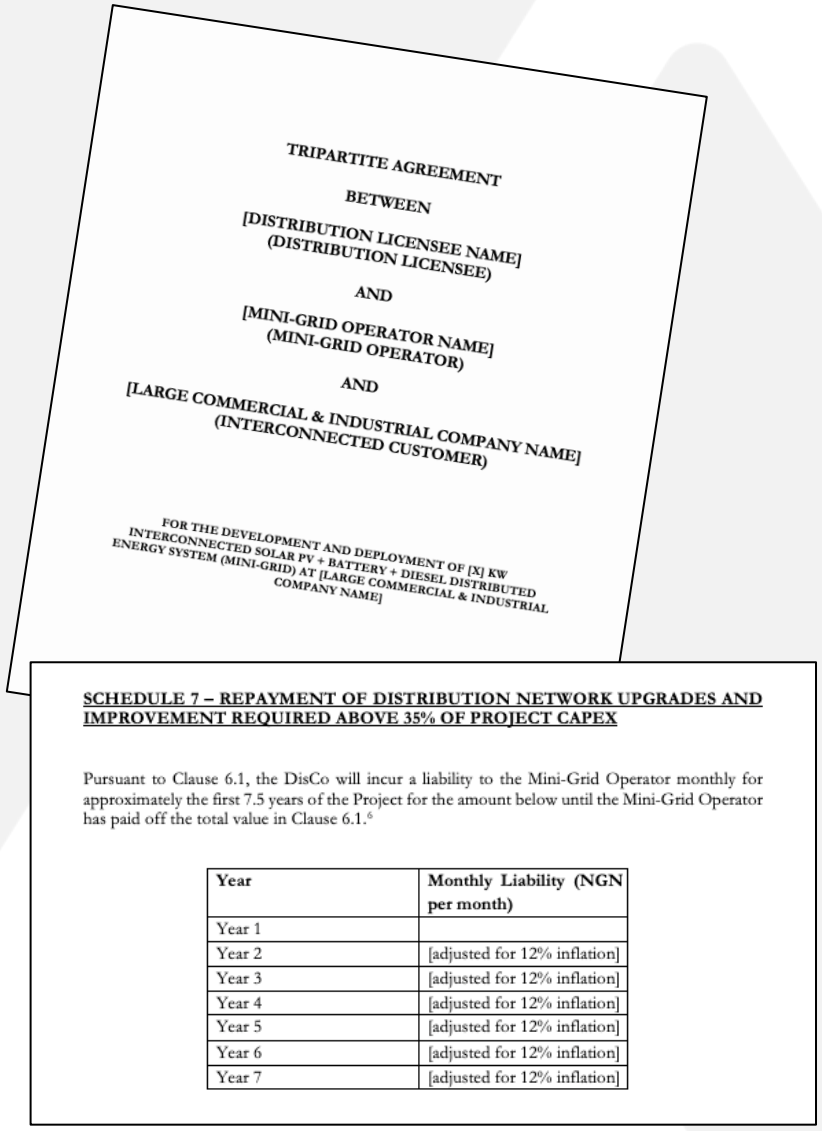
- **identify feasible** utility-enabled DER projects,
- **understand** the **steps** required to **initiate, prepare and execute** a utility-enabled DER project,
- **define responsibilities** between utilities and DER project developers,
- estimate **how long it will take** to complete these steps, and how they can **mitigate common risks** along the way,
- and understand the steps for **achieving compliance** with all institutional, **legal, regulatory and standards requirements**, including all **necessary approvals, certifications and permits and their typical timeline.**



Summary of implementation phases and steps

B. Project agreement templates define key terms, and transaction arrangements to be negotiated by parties

	Key contract terms (illustrative)
Term	10-20 year contract *(Depending on business model)*
Priority hours and availability standards	Grid: responsible to supply the community during **3:00pm–8:59am***, *(parties can align)* DER: responsible to supply the community during **9:00am–2:59pm**, with **95%** power availability
Tariff	Blended tariff at **N/kWh.** The blended tariff can be adjusted due to market conditions, or changes in the DisCo band tariff
Minimum consumption	The minimum consumption of electricity shall be **(x) kWh** in total every 6 months *(Applicable to C&I)*
Underperformance penalty	DisCo is liable to pay developer a fee (Recoverable Expenditure) if grid availability falls below the allowed minimum. *(Application to C&I and IMG)*
Billing and collection	The DER developer is responsible for billing the customer for all electricity received, while the utility will bill the DER developer for the electricity it provides. Depending on the business model there could be additional charge for DUOS and deduction for other project related debts(e.g., grid upgrade repayment if co-financed) the utility holds or incurs



TRIPARTITE AGREEMENT

BETWEEN

[DISTRIBUTION LICENSEE NAME]
(DISTRIBUTION LICENSEE)

AND

[MINI-GRID OPERATOR NAME]
(MINI-GRID OPERATOR)

AND

[LARGE COMMERCIAL & INDUSTRIAL COMPANY NAME]
(INTERCONNECTED CUSTOMER)

FOR THE DEVELOPMENT AND DEPLOYMENT OF [X] KW INTERCONNECTED SOLAR PV + BATTERY + DIESEL DISTRIBUTED ENERGY SYSTEM (MINI-GRID) AT [LARGE COMMERCIAL & INDUSTRIAL COMPANY NAME]

SCHEDULE 7 – REPAYMENT OF DISTRIBUTION NETWORK UPGRADES AND IMPROVEMENT REQUIRED ABOVE 35% OF PROJECT CAPEX

Pursuant to Clause 6.1, the DisCo will incur a liability to the Mini-Grid Operator monthly for approximately the first 7.5 years of the Project for the amount below until the Mini-Grid Operator has paid off the total value in Clause 6.1.[6]

Year	Monthly Liability (NGN per month)
Year 1	
Year 2	[adjusted for 12% inflation]
Year 3	[adjusted for 12% inflation]
Year 4	[adjusted for 12% inflation]
Year 5	[adjusted for 12% inflation]
Year 6	[adjusted for 12% inflation]
Year 7	[adjusted for 12% inflation]

*Numbers in blue are an example

C. Project financial model templates will be used to assess the financial viability of projects

The financial model templates will help users…

- calculate **developer's returns** like the projects' **net-present-value (NPV), internal rate of return (IRR), and payback period,**
- calculate the **DisCo's cashflows and NPV,**
- calculate the **customer tariffs,**
- determine project **funding needs** and **facilitate negotiation,**
- and perform **scenario and sensitivity analysis** to assess the impact of changes in key variables on project returns.

Developer Summary and Charts

Project Economics

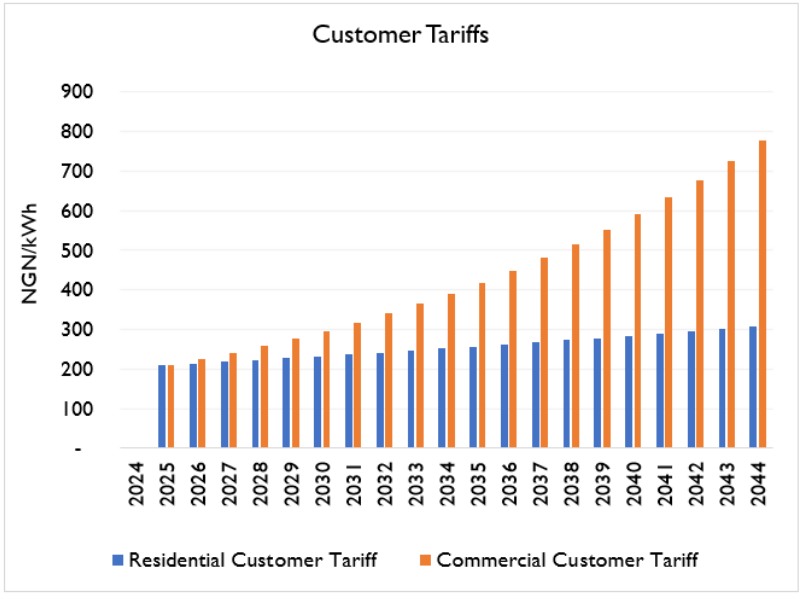
Starting Residential Customer Tariff	NGN/kWh	210
Starting Commercial Customer Tariff	NGN/kWh	210
Starting Residential Customer Tariff	USD/kWh	0.15
Starting Commercial Customer Tariff	USD/kWh	0.15
Total Grant Amount	USD	938,439
Total Debt Amount	USD	978,776

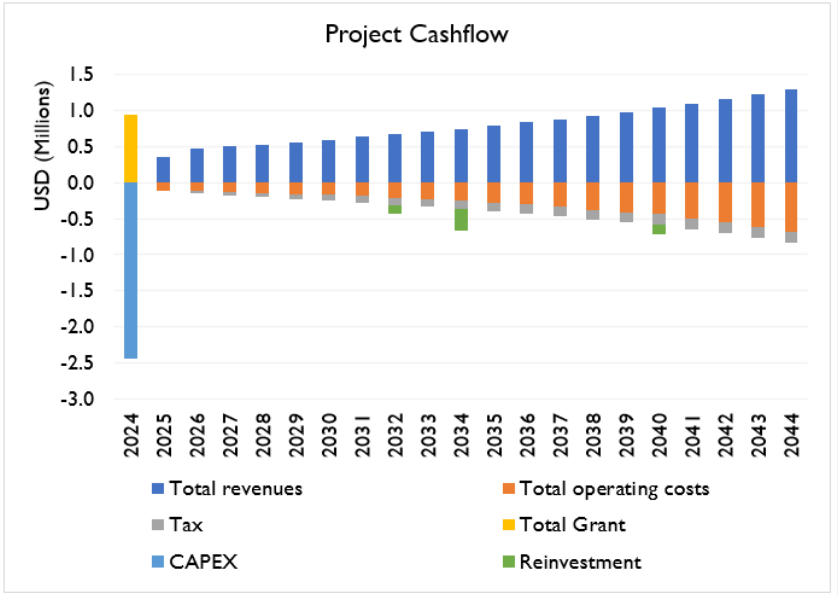
Project CAPEX Summary

Generation Assets	USD	1,795,492
Distribution Assets	USD	378,839
Metering	USD	151,414
Project Development	USD	121,194
Other	USD	-
Total	USD	2,446,939

Unit CAPEX Costs

Solar PV	USD/kW	902100
Battery Storage Syste	USD/kWh	480160
Diesel/Gas Genset	USD/kVA	135306
Land	USD/acre	0
Metering	USD/mete	151414



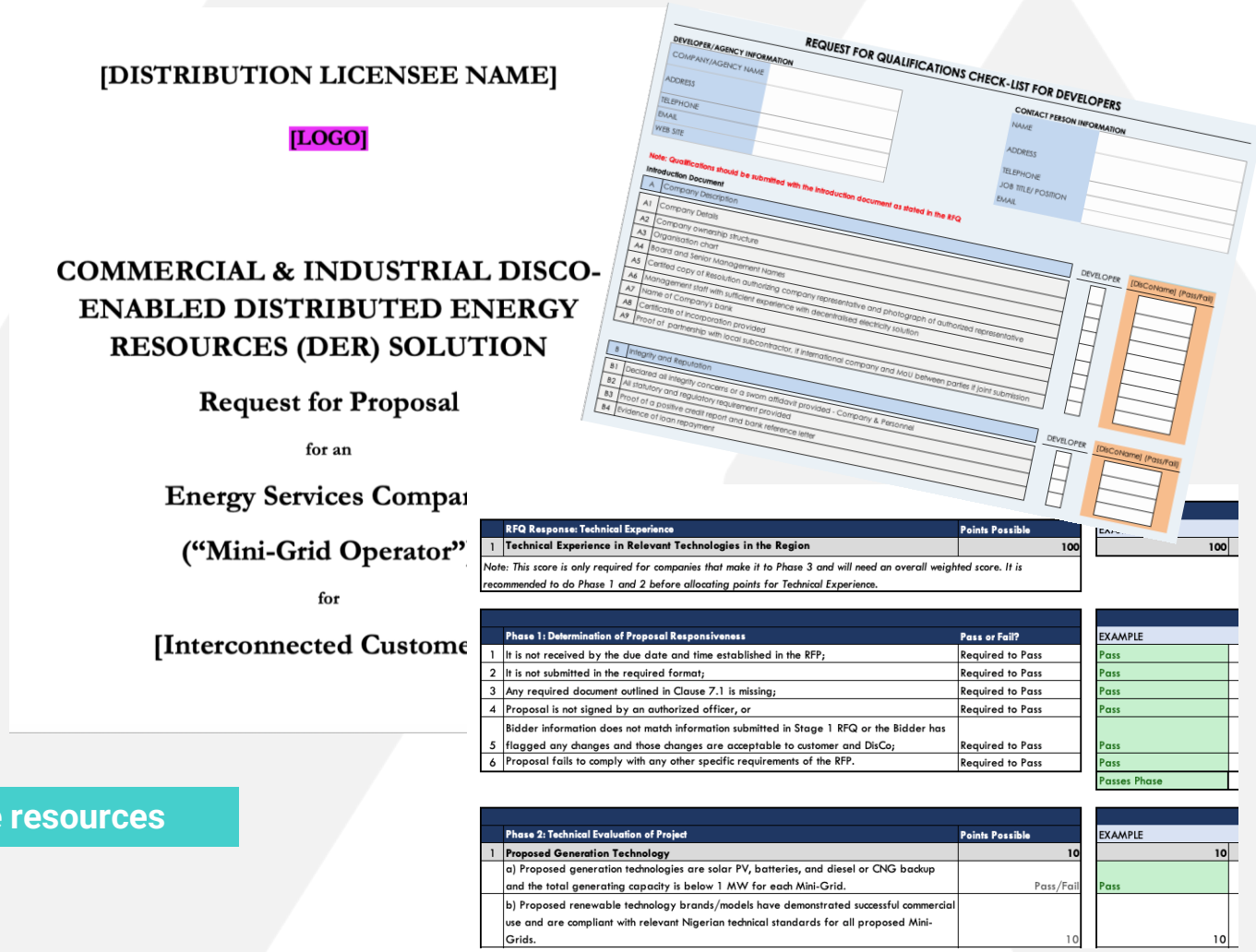


Sample dashboard from the IMG financial model template

D. Request for qualifications and proposals (RFQ & RFP), and evaluation templates to support competitive project tenders

The project procurement templates will help users…

- **structure procurement into a 2-stage competitive procurement,**
- **solicit bids** from energy service companies and DER project developers,
- specify the **requirements** that would be **reflected in agreements,**
- **and evaluate proposals** from developers based on chosen criteria such as their project implementation track record, commercial history, financial capabilities, etc.



[DISTRIBUTION LICENSEE NAME]

[LOGO]

COMMERCIAL & INDUSTRIAL DISCO-ENABLED DISTRIBUTED ENERGY RESOURCES (DER) SOLUTION

Request for Proposal

for an

Energy Services Compa

("Mini-Grid Operator"

for

[Interconnected Custome

REQUEST FOR QUALIFICATIONS CHECK-LIST FOR DEVELOPERS

DEVELOPER/AGENCY INFORMATION

COMPANY/AGENCY NAME

ADDRESS

TELEPHONE

EMAIL

WEB SITE

CONTACT PERSON INFORMATION

NAME

ADDRESS

TELEPHONE

JOB TITLE/ POSITION

EMAIL

Note: Qualifications should be submitted with the introduction document as stated in the RFQ

Introduction Document

A Company Description

A1 Company Details

A2 Company ownership structure

A3 Organization chart

A4 Board and Senior Management Names

A5 Certified copy of Resolution authorizing company representative and photograph of authorized representative

A6 Management staff with sufficient experience with decentralized electricity solution

A7 Name of Company's bank

A8 Certificate of incorporation provided

A9 Proof of partnership with local subcontractor, if international company and MoU between parties if joint submission

B Integrity and Reputation

B1 Declared all integrity concerns or a sworn affidavit provided - Company & Personnel

B2 All statutory and regulatory requirement provided

B3 Proof of a positive credit report and bank reference letter

B4 Evidence of loan repayment

DEVELOPER

[DisCoName] (Pass/Fail)

DEVELOPER

[DisCoName] (Pass/Fail)

	RFQ Response: Technical Experience	Points Possible
1	Technical Experience in Relevant Technologies in the Region	100

Note: This score is only required for companies that make it to Phase 3 and will need an overall weighted score. It is recommended to do Phase 1 and 2 before allocating points for Technical Experience.

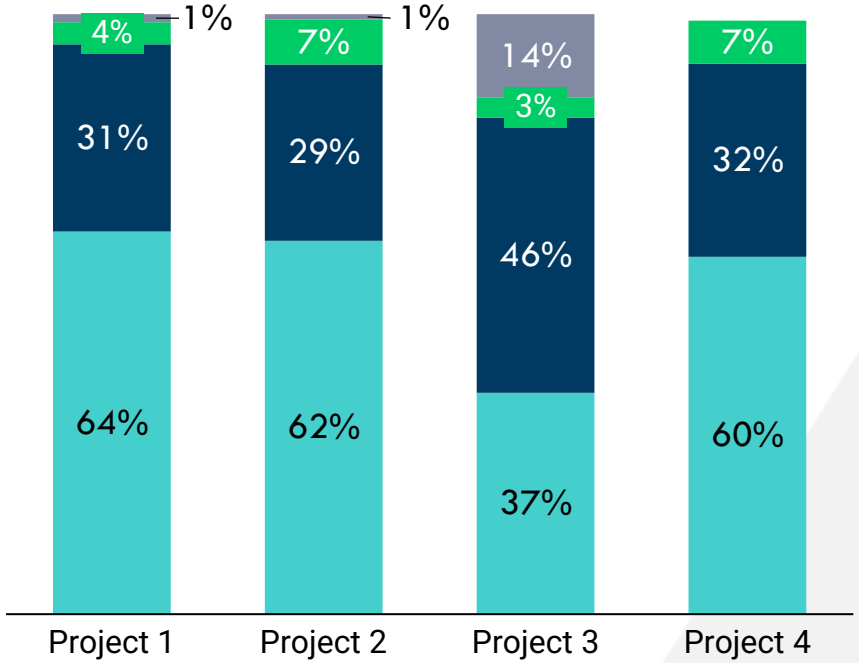
	Phase 1: Determination of Proposal Responsiveness	Pass or Fail?	EXAMPLE
1	It is not received by the due date and time established in the RFP;	Required to Pass	Pass
2	It is not submitted in the required format;	Required to Pass	Pass
3	Any required document outlined in Clause 7.1 is missing;	Required to Pass	Pass
4	Proposal is not signed by an authorized officer, or	Required to Pass	Pass
5	Bidder information does not match information submitted in Stage 1 RFQ or the Bidder has flagged any changes and those changes are acceptable to customer and DisCo;	Required to Pass	Pass
6	Proposal fails to comply with any other specific requirements of the RFP.	Required to Pass	Pass
			Passes Phase

	Phase 2: Technical Evaluation of Project	Points Possible	EXAMPLE
1	Proposed Generation Technology	10	10
	a) Proposed generation technologies are solar PV, batteries, and diesel or CNG backup and the total generating capacity is below 1 MW for each Mini-Grid.	Pass/Fail	Pass
	b) Proposed renewable technology brands/models have demonstrated successful commercial use and are compliant with relevant Nigerian technical standards for all proposed Mini-Grids.	10	10

Ongoing DisCo procurements are already leveraging these resources

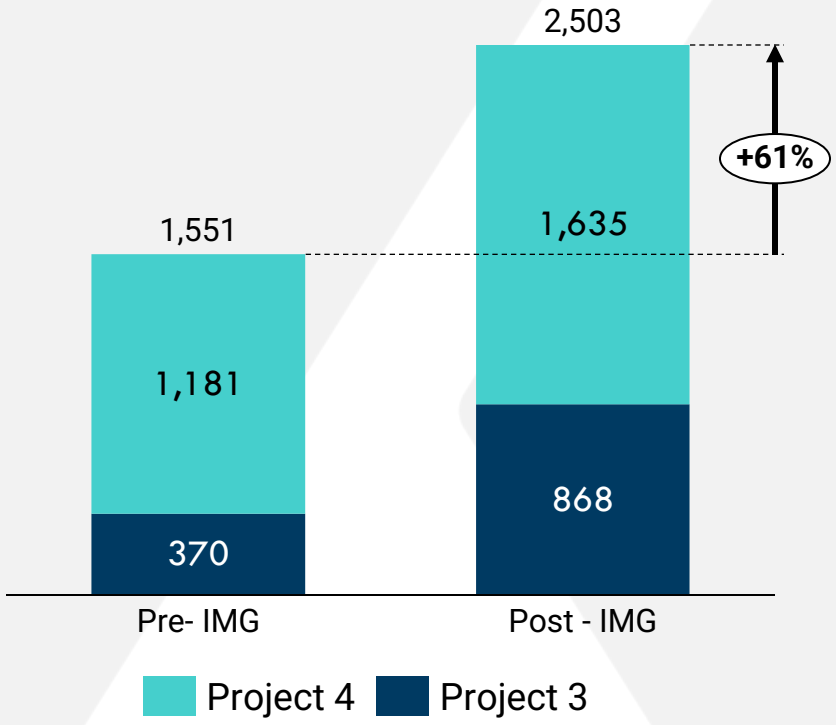
E. The DER toolkit best practices reports are used to share data-driven learnings and insights

IMG cost categories as a percentage of total project CAPEX



Distribution and interconnection system costs can be up to 46% of total project costs

Number of customers before and after the IMG



***61 %** increase in number of customers in IMG communities*

4. Case studies

From operational projects, a larger number of projects are in construction phase

Toto IMG provides >12 hours of daily electricity to a community which had no electricity for years

Key project features	
Size	350 kW
Location	Toto, Nasarawa
Developer	PowerGen Ltd
DisCo	Abuja Electricity Distribution Company
Total cost	USD 3.2 Mil
COD	November 2023

Project insights

- Customer connections grew by over 3x in the first year of operation, from 305 to 1580.
- Average monthly consumption per user (ACPU) is five times those of isolated minigrid in SSA - AMDA 2022.
- DisCo supply power availability and quality resulted in higher hours of backup genset operation, ultimately impacting the end-user tariff.
- Embedding a DER Officer at DisCos helped streamline timelines and avoided mitigated delays.
- Clarifying and standardizing roles and responsibilities between developers and DisCo is critical in accelerating project implementation.

Outcomes

100% Increase in collection efficiency	**100%** Increase in billing efficiency	**3** New direct jobs created	**₦ 2.7 Mil** Estimated increase in DisCo annual revenue

Zawaciki IMG has increased power supply from 4 to 15 hours per day for over 868 customers at Zawaciki

Key project features	
Size	1 MW
Location	Zawaciki, Kano
Developer	Bagaja Renewables Ltd
DisCo	Kano Electricity Distribution Company
Total cost	USD 2.59 Mil
COD	January 2024

Project insights

- The project's success has spurred the DisCo to partner with other developers for larger-scale projects.
- In addition to the residential and SMEs, there are three large energy consumers in the cluster that are now powered by the IMG.
- Standardization of regulatory requirements for grid interconnection is key to facilitate project commissioning.
- Enhanced collaboration between developers and DisCos improves transfer of technical know-how on managing utility business.
- Reliable and improved energy supply has increased the daytime energy demand by over 35%, driven mainly by commercial customers.

Outcomes

45% Increase in collection efficiency	**96%** Increase in billing efficiency	**17** New direct jobs created	**₦ 0.45 Mil** Estimated increase in DisCo annual revenue

Panelists

Chigozie Azikiwe, NERC
Assistant GM, Market Analysis,
Market Competition, Rates Division

Ojuru Adeniji, InfraCredit
VP, Origination & Structuring

Omosede Imohe, AEDC
DER Team Lead

Victor Ezenwoko, Daystar Power
Country Head, Nigeria & Ghana

Fatima Haliru, Ikeja Electric
Power Purchase Lead

Thank you!

Learn more about RMI's DER Hub at:
rmi.org/utility-enabled-distributed-energy-resources-hub/